
Correlation of Battery Exam to Academic Performance and Licensure Examination Among Medical Technology Students of FEU-NRMF

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ABSTRACT

The passing percentage of FEU-NRMF School of Medical Laboratory Science graduates on the Licensure Examination is one of the school's concerns; thus, the researchers' primary objective was to see if academic performance and battery examination results can predict licensure exam success for medical technology students

A sample of 202 respondents from Batch 2016-2018, who graduated from the said program were surveyed. Variables gathered were the battery examination and the academic performance of the respondents from the Office of the College Registrar. Collected data were analyzed with descriptive quantitative statistics. Distribution of the Respondents on their performance in the battery examination, GWA, and MTLE was described using mean and frequency percentage. The association between battery examination, GWA, and MTLE performance were determined using Pearson product moment correlation and multiple regression analysis.

With this study, findings revealed that there was a direct correlation among the academic performance, battery examination and the licensure examination of BSMLS students, it was concluded that the two variables were the predictors for the students to pass and attain a higher rating in the MTLE. The computed coefficient gave a positive interpretation that in every one unit increase in the predictors there would be an increase in the overall Licensure Examination Performance for the FEU-NRMF BSMT students.

Furthermore, the study would benefit the faculty and administration to know the predictors that may affect the success of licensure examination; therefore, improving the BSMLS program and continue to offer high-quality education to effectively prepare the students to practice their profession in a competitive environment.

Key words: Battery exam, academic performance, Medical Technology Licensure Examination (MTLE), General Weighted Average (GWA)

The Far Eastern University – Nicanor Reyes Medical Foundation (FEU-NRMF), an educational institution in the Philippines that caters medical and allied health programs. The FEU-NRMF MT/MLS Program has delivered graduates that are internationally competitive, very much employable, and most of its alumni have become prominent in international and national events related to medical and scientific field since 1961 and produced approximately more than 350 topnotchers in the Medical Technology Licensure Examination since 1970. In the last five years, the Professional

Regulatory Commission (PRC) has continuously named FEU-NRMF as one of the best performing universities in the country.

To prepare the students of FEU-NRMF, the School of Medical Laboratory Science is giving battery exams to the incoming third year students, who qualified and passed the second semester of their second year level. The battery exam consists of a total of 150 multiple choice questions coming from different subjects that were already taken during the first two years of Medical Laboratory Science. The subject chosen is known to provide a suitable foundation on the critical thinking skills of

the students necessary to help them go through their 3rd year academic course.

Entrance exams, battery exams or qualifying exams are given by the universities to assess students who intend to enroll or pursue a chosen course in a particular institution. Student's academic performance, used as a measure of their intellectual competence based on the institution's rules and practices, is the first measure of a student's achievement after a year at the university.¹ In relation to this, the academic performance of students can be evaluated using two known predictors: cognitive predictors and non-cognitive predictors. The Cognitive Predictors use standardized assessments, such as the Scholastic Aptitude Test (SAT), qualifying exams, battery exams, high school exam results, or GWA grades, to gauge a learner's or student's propensity for learning. The affective and cognitive domains, which correspond to emotional responses and motivational or volitional processes, respectively, are the non-cognitive predictors. According to some research, non-cognitive factors, such as psychosocial, self-discipline, and family issues, may occasionally have a greater impact on a student's academic performance than cognitive ones. This may be because these uncontrollable factors fall outside the purview of the school or university. The most popular method for forecasting a student's academic performance is still the cognitive paradigm.² Another study emphasized the relationship between measurable cognitive pre admission variables and the student's outcome under the nursing program of a Midwestern university. The use of pre admission variables like the Grade point average (GPA) and Test of Essential Academic Skills (TEAS), can be used to early predict students' success and may be helpful in determining the intellectual or comprehension capability of applicants whom that would likely do well through graduation, and licensure exams or drop/fail out through the first year of a two-year nursing program.³ In the study conducted by George Tan Geok Shim, et.al. 2017,⁴ which determines the relationship between students' diagnostic assessment and achievement in a Pre-University Mathematics Course concluded that the students who perform well on the Mathematics diagnostic test also perform well in the pre-university Mathematics course, and these are the type of students who can adopt easily to new changes in the curriculum or syllabus implemented by colleges and universities compared to students who got low test scores.⁴ In the study by Shaycoft et al.,⁵

PNG battery examinations were also used to assess the student's performance on the licensure exam and in graduating from the nursing school program. The general areas of Math, Science, and Social Studies are covered in the PNG Battery exam. The results of the study demonstrate that the battery exam had sufficient validity or may be used as a screening tool to select nursing students. In general, the battery exam is most successful in identifying whether or not an applicant has the academic aptitude to understand nursing school coursework and pass state licensure requirements.

The aim of this study was to correlate the result of the battery exam given by the School of Medical Laboratory Science at FEU-NRMF to the 3rd year academic performance, which is composed of two semesters as well as if it has a good predictive value on the result of the Board exam or Licensure exam. It will also identify the effectiveness of the said battery exam as a diagnostic tool to predict the outcome of student performance in relation with the FEU-NRMF-School of Medical Laboratory Science standards. Data gathered from assessment may also provide vital data for defining program efficacy, enhancing teaching methods or strategy, and assisting in the improvement of learning and educational concepts or models.

MATERIALS AND METHODS

Research Design

The researchers used a retrospective, analytic cross-sectional design that employed a secondary data analysis. The correlation approach was used in this study to determine the link between the independent variables: battery examination, academic performance, and the dependent variable: licensing examination in medical technology professional topics. The degree of link was determined through calculation of the correlation coefficient between the two variables.

Study Population

The study included two hundred two (202) BSMLS/MT students from academic year 2016 to 2018 who met the criteria of taking the battery exam, who enrolled in the third year BSMLS/MT program, and took the board exam. Included were BSMLS students who enrolled at the FEU-NRMF School of

Medical Laboratory Science and took the battery exam and licensure examination. Excluded were BSMLS students who did not enroll at the FEU-NRMF School of Medical Laboratory Science. Additionally, those students of other year levels and programs or courses in FEU-NRMF and students who dropped out were also excluded. Using the convenience sampling, only the data from students who graduated and took the board exam during year 2016-2018 were included.

Data Collection and Preparation

The researchers requested permission from the School of Medical Laboratory Science Office to get the students' battery test results as well as their overall weighted average from the Registrar's Office in order to determine the link between the factors or variables. The participants in the study were Bachelor of Science in Medical Technology graduates of the Far Eastern University-Dr. Nicanor Reyes Medical Foundation from batches 2016 to 2018 who had completed their college degree and who took the battery and license examination. The license examination ratings of the selected students granted by the Professional Regulation Commission to the School of Medical Technology were also required, therefore, a consent from the college dean or head was asked. The statistician examined the data to see whether there was any correlation or association between the variables.

Paradigm of the Study

The operational paradigm above shows the relationship between the independent variable, the dependent variable, and the anticipated results of the study. The Battery Examination and the General Weighted Average make up the independent variable while performance on the licensing examination by the graduates is the dependent variable.

Data Processing and Statistical Treatment

Data were tabulated, analyzed, and interpreted. Frequency and percentage were used to analyze their GWA scores. Mean scores and standard deviation were utilized to describe battery examination, GWA, and licensure examination of BSMLS graduates. Pearson correlation and multiple regression analysis were used to determine the relationship among battery examination, GWA, and licensure examination. All statistical data were treated using Statistical Package for Social Science (SPSS) version 20. A p-value of less than 0.01 was considered statistically significant for all the analyses.

RESULTS AND DISCUSSION

Table 1 shows that most of the respondents (39.1%) performed satisfactorily in their academic performance. Furthermore, only (4.9%) were excellent in their academic performance. Unfortunately, (23.7%) of the total number of respondents were rated poorly in their academic performance in college.

Table 1. Distribution of respondents according to general weighted average.

Limit	Description	Frequency	%
1.00-1.25	Excellent	10	4.95%
1.50-1.75	Very Good	26	12.87%
2.00-2.25	Good	38	18.81%
2.50-2.75	Satisfactory	79	39.11%
3.00	Passed	1	0.50%
5.00	Failed	48	23.76%
	Total	202	100%

Table 2 shows that almost half of the total number of respondents performed fairly in the battery examination administered by the university. Forty-one of the respondents failed in the said examination and only 3.96% of the respondents are rated very good in the examination. None came up with an excellent score.

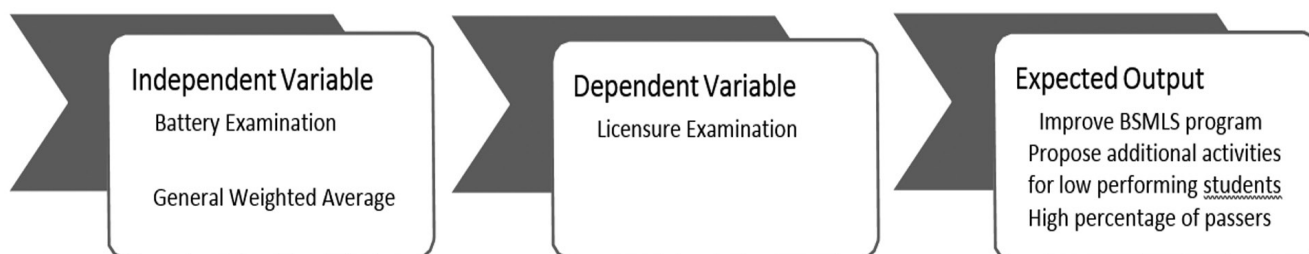


Table 2. Distribution of respondents according to battery test scores.

Limit	Description	Frequency	%
100-90	Excellent	0	0
89-85	Very Good	8	3.96%
84-80	Good	55	27.23%
79-75	Fair	98	48.51%
74-below	Failed	41	20.30%
		Total = 202	100%

A Pearson Product - Moment correlation was utilized to determine the relationship between battery examination and academic performance and board examination. There was a strong direct correlation between battery examination and academic performance which was statistically significant ($r = 0.548$, $n = 202$, $p < 0.01$). There was also a strong direct correlation between board examination and academic performance ($r = 0.671$, $n = 202$, $p < 0.01$); and there was also a strong direct correlation between battery examination and board examination ($r = 0.501$, $n = 202$, $p < 0.01$). This means that these variables tend to increase together, which implies that the better the performance in battery examination, the better is the academic performance as well as the board examination result.

A multiple regression was used to predict board examination performance from academic performance and battery examination. The first symbol is the unstandardized beta (β). This value represents the slope of the line between the predictor variable and the dependent variable. So, for every one unit increase in Academic Performance, the dependent variable increases by 0.753 units. Similarly, for Variable Battery Examination, for every one-unit increase, the dependent variable increases by 0.197 units. The results show that these variables statistically significantly predicted board examination, ($\beta=0.567$ and $\beta=0.190$). All two variables added statistically significantly to the prediction, $p<0.05$. The results only mean that the academic performance scores and battery examination scores of the respondents have direct positive association to their average MTLE performance. Moreover, it can be said that getting a high academic performance score and battery examination scores in college can be a great factor in achieving a good performance in the licensure examination. Hence, these two variables are a good

predictor of success in the Licensure Examination for Medical Technologists.

The statistical data showed that the FEU-NRMF SMLS battery exam scores or results could predict if the students performed well or not in their 3rd year academic years and in the Medical Technology Board exam or Licensure Exam. The Pearson product-moment correlation coefficient was calculated on a standard scale that gave ranges between -1.0 and +1.0. As such, the correlation coefficient could be understood as demonstrating an effect size. It was revealed that the strength of the relationship between the two variables included in the study were the Battery Exam Scores in the 3rd year level academic performance (as reflected by their GWA) and the Board Exam Result. To better understand this, if the computed correlation is near zero (0) it meant that the relationship between the variables is weak; however, if the result near one (+1) the correlation is strong but if it is negative (-1) meaning that there is an inverse correlation. In this study, a result of $r=0.50$ and above was considered to have a moderate to high correlation between the two variables compared, and if the coefficient correlation 2-tailed is <0.01 , it meant that the relationship of variables was highly significant. As shown in Table 3, using the Pearson- Product Moment correlation, the battery exam result was statistically significant with a $r = 0.548$, meaning that there was strong relationship to the academic performance (i.e. GWA) during the 3rd year level, which showed that these variables tend to increase together, and with correlation 2-tailed of $p=0.000$ value showed a highly significant relationship between the variables correlated. This implies that the better the performance in battery examination; the same goes to the academic performance. The Battery exam scores also had a strong predictive assessment on the performance of the licensure exam with a r value of 0.501 and a correlation 2-tailed value of $p=0.000$. Moreover, the academic performance during the 3rd year level showed a strong predictive value demonstrating a highly significant correlation of it to the Licensure exam result with an r value of 0.671 and $p\leq 0.01$.

In table 4, a multiple regression was used to predict or analyze the relationship of the value of a variable on the value of two or multiple variables. In multiple regression, the dependent variable, also known as the outcome or target variable, is the value that is being predicted. The independent variables, also known as predictor or regressor variable, on the other hand was

Table 3. Relationship between battery examination and academic performance and board examination.

	Academic Performance	Battery Examination	Board Examination
Academic Performance	1.00	.548 **	.671 **
Battery Examination	.548 **	1.00	.501 **
Board Examination	.671 **	.501 **	1.00

** . Correlation is significant at the 0.01 level (2-tailed)

Table 4. Predictor of board examination performance.

Model		Unstandardized Coefficients		Standardized Coefficients	t-value	p-value
		B	Std. Error	Beta		
1	(Constant)	0.499	0.222		2.242	0.026
	Academic Performance	0.753	0.081	0.567	9.244	0.000
	Battery Examination	0.197	0.064	0.190	3.097	0.002

Legend: Significant at p-value < 0.05

used to predict the value of the dependent variable. In this study, the dependent variable is the result of the Board exam while the independent variables are the Battery exam results and the Academic performance during the 3rd year level (using the GWA). In multiple regression, if the p value is <0.05, there is significant correlation between the dependent variable and two or more independent variables. Based on the study, the academic performance has a value of $p = 0.000$, while the Battery exam has $p = 0.002$, showing that these variables are statistically significantly predicted the board examination result, ($F(2, 199) = 90.339$, $p < 0.05$, $r^2 = 0.476$).

In the similar study conducted by De Leon 2016,⁶ they evaluated the relationship of E-learning and the General Weighted Average (GWA) of students with the Nursing Licensure Exam (NLE). 1,257 nursing graduates from the School of Nursing from the three campuses in Manila were included in the study. The GWA and NLE performance correlation findings showed a strong correlation for graduates from 2012 (-.72.5) and 2013 (-.74.05), while a moderate negative correlation for graduates from 2011 (-.59.05) who took the NLE in June and July. In addition to that, graduates of 2011 (-.84.05) and 2013 (-.73.05) who

took the December NLE had a strong negatively linked GWA and NLE performance but graduates of 2012 had no significant result. The relationships between E-learning and GWA performance and NLE performance were established. As a result, the higher the E-learning and GWA scores, the better the NLE scores, and the lower the E-learning and GWA scores, the lower the NLE scores.

Pasia et al., 2016⁷ revealed that the Determinants of Performance of Graduates in the Medical Technologist Licensure Examination. The MTLE was correlated with the type of high school from which the student graduated, the high school general average, the Differential Aptitude Test, General Education WPA, Professional Subject WPA, Internship WPA, and Overall WPA. General education WPA, professional topic WPA, internship WPA, and overall WPA all had a moderate correlation to MTLE, with internship WPA having the highest coefficient of correlation of 0.540.e

However, De Leon et.al. (2016),⁶ explained in her paper entitled, Correlation among the General Weighted Average, Mental Ability and Battery Test Scores of First Year Teacher Education Students investigated that there was a relationship between first year teacher education students' general weighted averages, mental ability test scores, and battery test scores at the Bulacan State University Bustos Campus. The general weighted averages and battery test scores showed to be negatively correlated in this study ($p \text{ value} = -0.6002$). This indicates that if the battery test results are high, the general weighted average would be poor, and vice versa. The findings of the previous study contradicted the findings of the present study.

On the other hand, Cabanban 2017⁸ correlated the Academic Performance in Medical Technology Professional Subjects and Licensure Examination Results. Graduates who took the licensure examination from September 2006 to September 2010 were included in the study. Most medical technology graduates, according to the study's findings, had average academic performance in most professional areas and performed poorly on numerous subtests of the medical technology licensure examination. Furthermore, there is a weak to moderate connection between academic success and passing scores on licensure exams. As for the researcher's recommendation, there is a need for an in-house review enhancement program to enable faculty members and reviewers identify themes that should be highlighted among future licensure

applicants and to improve graduates' performance on the medical technology licensure test.

Scope and Limitation

The scope of the research study was specifically focused on the licensure examination results and academic performance in the 3rd year level of Medical Laboratory Science students and their relationship with battery examination administered by the FEU-NRMF School of Medical Technologists under the rules and guidelines implemented by the FEU-NRMF Admission office. Student records of batches 2016 through 2018 were requested. The study was limited only to general weighted average (GWA) during the 3rd year academic level, battery examinations that were administered at the end of second year level and licensure exam results of graduates. Moreover, the study did not focus on other assessment or diagnostic tools. The findings and conclusions that were analyzed were based solely from the findings specific to the examination process at FEU-NRMF and it would be difficult to generalize this examination to other medical schools. However, medical schools could follow the method used to assess their students' performance.

CONCLUSION

This preliminary investigation was conducted to see if there was a link between the students' battery exam outcomes, accumulated GWA, and licensure examination scores. The following conclusions were drawn from the findings:

1. The majority of respondents reported "satisfactory" academic performance.
2. The majority of respondents had "average" license examination results.
3. The majority of responders performed "fair" on the battery test.
4. There was a favorable relationship between the battery test results and the respondents' overall weighted averages.
5. The general weighted averages and the respondents' licensure examination had a positive association.
6. The respondents' battery test scores and their licensure examination scores were positively connected.

The battery examination result was statistically significant, indicating a strong correlation with

academic achievement (i.e., GWA) at the third-year level. This indicated that these variables tended to rise together and that there was a highly significant correlation between the variables. This implies that academic performance is correlated with battery examination performance. Additionally, the results of the Battery examination also provided a highly predictive evaluation of the performance of the licensure examination and the third-year academic performance demonstrated a great predictive value, indicating a highly significant correlation between it and the outcome of the licensure exam.

In terms of application, this study provides key insights that will serve as a roadmap for monitoring the performance of its graduates on the licensure examination. The findings of this study may also provide a conceptual framework for retention policies and pre-board review procedures that the FEU- NRMF will put in place to enhance the performance of graduates on the MTLE.

RECOMMENDATION

Based on the conclusions drawn, the following recommendations were offered:

1. Other researchers may pursue the study by increasing the number of respondents. Our study only includes 2 academic years due to filing issues of the data needed.
2. Improvement of the Battery examination must be validated from time to time to ensure that the students are capable in taking the professional subjects.
3. Further study should be conducted on the other predictors that may affect the success of the students in the licensure examination.
4. Former students who were debarred from the program may have follow-up studies done on them, but those who did better on their licensing exams may be reviewed. The outcomes could provide important information about how well the school's retention strategies identify underachievers.
5. The School of Medical Laboratory Science should continue the Counselling Program for those students who are academically challenged to meet their specific needs.

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